

## Tensegrital Wheel for Enhanced Surface Mobility, Phase I

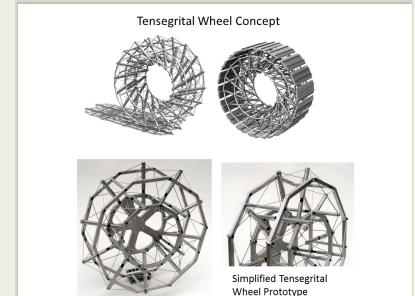
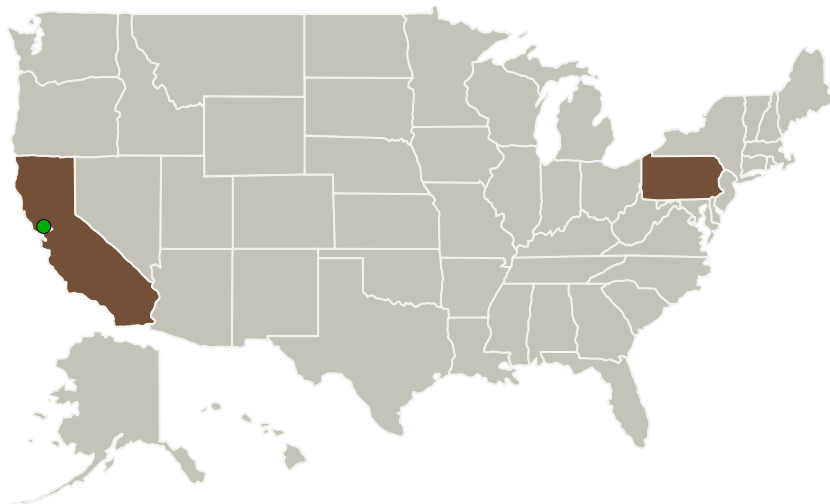
Completed Technology Project (2017 - 2017)



## Project Introduction

ProtoInnovations introduces the "tensegrital wheel" an inventive concept for wheeled locomotion that exploits the geometric and mechanical attributes of a tensegrity structure to engage with the terrain in an effective and efficient manner. The tensegrital wheel emulates the behavior of a variable pressure tire without the need for an inflation system. The construction of the tensegrital wheel is such that it absorbs and diffuses ground forces fairly evenly. The stiffness of the tensegrital wheel can be tuned to match the demands of a given environment that the wheel is to operate in or can be adjusted on-the-fly. These attributes allow for better adaptation to the terrain thus increasing the amount of thrust that can be generated at the wheel/ground interface, and improving a vehicle's dynamic response and obstacle negotiation abilities. We assert that the tensegrital wheel can be designed to achieve a very high strength-to-weight ratio and exceptional capacity for long-life specifically in the context of planetary exploration. For the Phase I of this SBIR project we aim to prove the feasibility of the tensegrital wheel and quantify its capabilities and limitations through analysis, prototyping, and testing. The technology proposed here is of particular value to planetary missions involving mobility over various terrain geometries and ground compositions.

## Primary U.S. Work Locations and Key Partners



Tensegrital Wheel for Enhanced Surface Mobility, Phase I Briefing Chart Image

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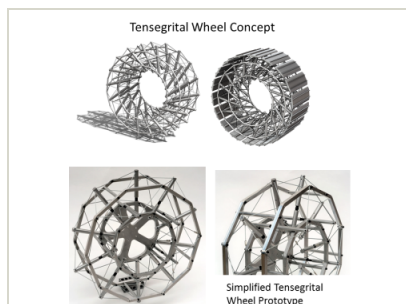
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Organizations Performing Work	Role	Type	Location
Protoinnovations, LLC	Lead Organization	Industry	Pittsburgh, Pennsylvania
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

## Primary U.S. Work Locations

California	Pennsylvania
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## Images



## Briefing Chart Image

Tensegrital Wheel for Enhanced Surface Mobility, Phase I Briefing Chart Image  
(<https://techport.nasa.gov/image/126674>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Protoinnovations, LLC

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

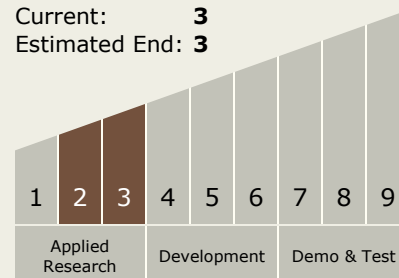
Carlos Torrez

## Principal Investigator:

Dimitrios Apostolopoulos

## Technology Maturity (TRL)

Start: 2  
Current: 3  
Estimated End: 3



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## Technology Areas

### Primary:

- TX04 Robotic Systems
  - └ TX04.2 Mobility
    - └ TX04.2.4 Surface Mobility